Industrial Standardization

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This Issue: ***Our Front Cover: Photograph Courtesy Bethlehem Steel Corporation***

ASA

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Large Rivets

Courtesy Bethlehem Steel Corp.

New American Standard covering diameters from ½ to 1¾ in. rivets enables manufacturers to give better service with smaller stock

by

P. G. Lang, Jr.[1]

Member, Subcommittee on Large Rivets, Sectional Committee on Bolt, Nut and Rivet Proportions

APPROVAL by the American Standards Association of the American Standard for Large Rivets has brought to completion eleven years of work by a representative committee of the American Standards Association.

The standard for these rivets—½ inch to 1¾ inch nominal diameter—includes the dimensions of the driven shapes of four of the six types of rivets, and the dimensions of the corresponding hold-on (dolly bar) and rivet set impressions. These last were added at the suggestion of the die-set manufacturers.

Before the start of the committee's work, there were many different forms of rivets, and each form was subject to extensive diversification. Rivets were apparently made without reference to any established rule or specific requirement, and seemed to represent arbitrary whim or random selection. One of the largest rivet manufacturers in the United States has said that the standardization of rivets as provided by the new American Standard will enable him to reduce his stock of rivets from 20,000 to 5,000 tons, and still give better service to users.

Rivets Present Problems

A typical problem which presented itself for solution by the committee was that relating to the buttonhead and high buttonhead (acorn) types. It is surprising that some manufacturers appeared not to be aware of the demand for the

[1]Engineer of Bridges, Baltimore and Ohio Railroad.

high buttonhead (acorn) type of rivet. Such rivets have been in general use among bridge and structural builders for many years and it is also believed that they have been used to some extent in marine construction which requires tight rivets providing good grip and well-filled holes. The extent of its use is indicated by the fact that, during 1931, four large bridge companies used approximately 28,000 tons of high buttonhead (acorn) rivets.

High Buttonhead Is Tighter

Following are a few observations by such users:

"We find we get a tighter rivet by using the high buttonhead rivet, as it takes the top of the rivet and upsets the shank of the rivet in the hole."

"These rivets have sometimes been called 'strawberry heads'. We have always contended that the strawberry head rivet, being much higher and smaller in diameter than the finished rivet-head, will, during the process of driving, have the initial pressure given at the center of the head, and will consequently give a much better and tighter rivet, because it will tend to upset the rivet in the middle of the body and fill the hole before the driving tool comes into contact with that part of the rivet head which bears on the steel outside the rivet hole."

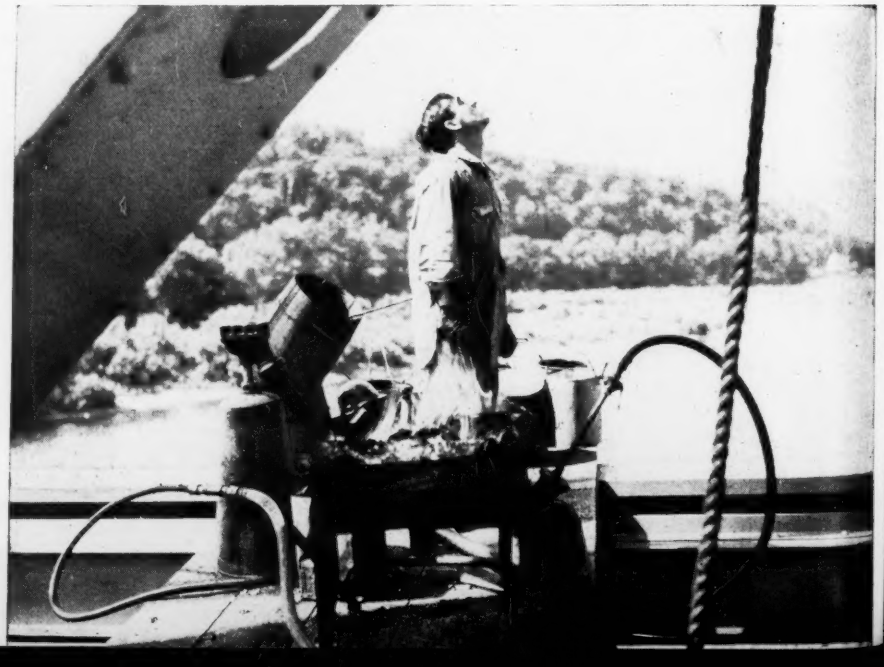
"If you will compare the amount of metal in the head shown with the amount of metal in the finished head after driving, you will find more metal in the former, which will have to be driven into the hole. This would tend to make a tighter rivet."

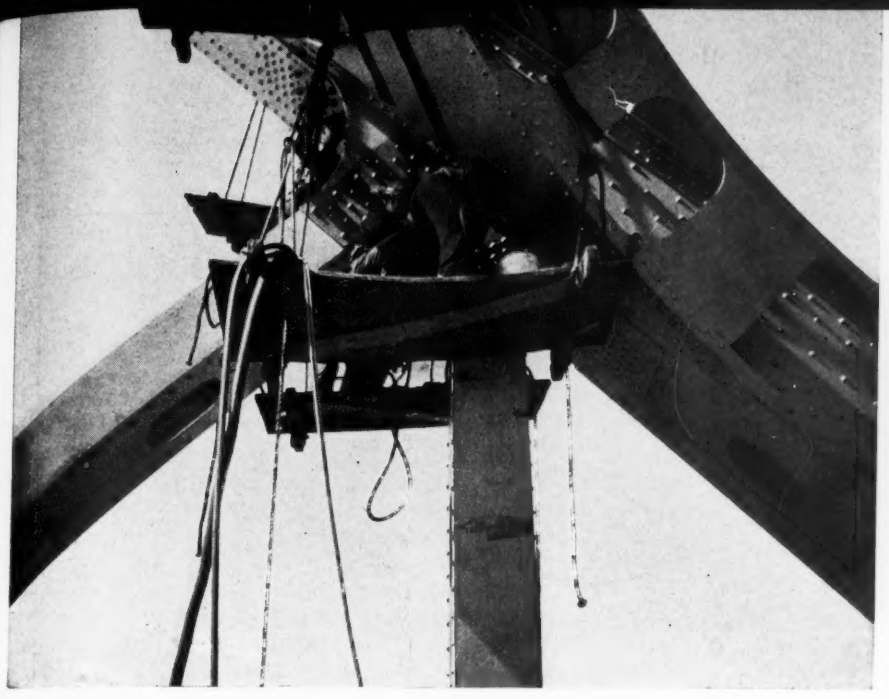
The question of hot and cold-heading of rivets is involved in this general problem. The cold-formed rivet is better adapted to electric heating, and results in a more finished job. Various factors, especially the introduction of electric heating, have apparently resulted in an increased demand for cold-formed rivets, because they represent a saving of from 15 to 20 per cent in the consumption of electric current for heating as compared with hot-formed rivets. This is principally due to better contact and reduction of difficulty from scale. On the high buttonhead, when manufactured cold, a slight flatness of head within the specified height tolerance is acceptable, and is of assistance when electric heating is used. Manufacturers say that many large rivets today are cold-formed, and that the high rivet can not be cold-formed as successfully as rivets of the types now being more widely used.

Because many users wanted the high buttonhead (acorn) type, however, it was suggested that it be included in the American Standard. This was objected to by the manufacturers because the demand for cold rivets would make it necessary to devise a method of successfully cold-heading the proposed rivet. On the other hand, it was felt that although this proposed high buttonhead (acorn) was not so well known it is a good type which should not be ignored. Accordingly, it was included in the standard in addition to the buttonhead, so that its advantages might become better known and its wider use encouraged.

The angle provided for countersunk rivets in the standard is 78 degrees in all cases. This was the subject of considerable discussion because in the opinion of some users a 60-degree angle was preferable. However, in practice there is very little difference between angles of 60 and 78 degrees. For many years, the angle for countersinking tools has been 78 degrees, or slightly larger, and the American Standard is, therefore, in accordance with the commonly used countersinking tool. Also, the angle adopted for rivets is identical with that for bolts.

The standardization of large and small rivets is part of a comprehensive project handled by the committee on Bolt, Nut, and Rivet Proportions,





organized under the procedure of the American Standards Association.

Subcommittee No. 1 on Large and Small Rivets first completed the American Standard for Small Rivets. This was approved by the ASA in July, 1927. The standard for Tinners', Coopers', and Belt Rivets was completed next and approved as an American Tentative Standard in 1928, and as an American Standard in 1929.

A number of major problems faced the subcommittee when it undertook the standardization of large rivets. The question of tolerances on the body diameter was taken up with the American Society for Testing Materials and the American Society of Mechanical Engineers' Boiler Code Committee. A proposal to develop specifications for certain classes of steel for use in the manufacture of rivets was considered but was abandoned by the committee after a full canvass of producers and consumers.

The committee sought standardization of material as well as of types and dimensions, and decided not to develop new specifications, but to refer in the American Standard to the appropriate A.S.T.M. standards for materials to be used in the various rivet types recommended.

Benefits Are World-Wide

The quest for simplicity and uniformity, and the economies resulting from standardization, are world-wide. In the beginning of its work the Rivet Committee extensively contacted producers and users throughout the United States and also sought contact with bodies engaged in similar work in other lands. It compared the numerous diagrams representative of American practice in the various fields of rivet use, and, in each case, sought the development of the rivet type best adapted to the specific field involved.

The American Standard for Large Rivets, ½-inch Nominal Diameter and Larger, has been in general circulation as a proposal for some time and was widely found to be satisfactory in practice before being submitted to the American Standards Association for final approval. It has been adopted by the American Institute of Steel Construction and some large users of rivets and will be adopted by the American Railway Engineering Association. (Committee on p. 228.)

Ohio, West Virginia Act To Prevent Ladder Accidents

Regulations to help eliminate the annual toll of injuries and deaths due to fire ladder accidents have been adopted in Ohio and West Virginia.

The Inspection Bureaus of these states have announced that in the future they will interpret "good practice" in ladder construction to mean that ladders must meet the technical requirements of the American Standard Safety Code for Construction, Care, and Use of Ladders. This safety code, approved by the American Standards Association, correlates expert opinion on the essential requirements for safe construction and use of ladders to prevent the estimated 140,000 injured, 700 killed in ladder accidents in the United States each year.

The regulations of the Ohio and West Virginia Fire Inspection Bureaus supplement the requirements of the American Standard safety code with additional specifications for type of material to be used. They also specify that ladders for fire department use should be especially built for fire department service and no attempt made to merely adapt commercial ladders to this use. This is because such ladders must necessarily be of better material and workmanship than those for ordinary purposes.

Copies of the American Standard Safety code (A14-1935) are 25 cents from the American Standards Association.

Varied Groups Agree On Rivet Standards

Many different organizations interested in making or using rivets are represented on the Sectional Committee on Bolt, Nut, and Rivet Proportions (B18). The American Society of Mechanical Engineers and the Society of Automotive Engineers are taking the administrative leadership for the work.

Members of the committee are:

Arthur E. Norton*, American Society of Mechanical Engineers, *Chairman

W. P. Acres*, Member at Large, *Secretary

American Society of Mechanical Engineers, *A. E. Norton*
Society of Automotive Engineers, *Joseph A. Anglada, W. L. Barth, Arthur Boor, Albert H. Gilbert, Merrill C. Horine*
American Boiler Manufacturers Association and Affiliated Industries, *Henry E. Aldrich*
American Bureau of Shipping, *Jacob Bergvall*
American Institute of Bolt, Nut and Rivet Manufacturers, *George S. Case, Harry C. Graham, James C. Rea, Evans Ward, R. J. Whelan, John S. Davey (alt.)*
American Railway Car Institute, *Victor R. Willoughby, J. J. McBride (alt.)*
American Society of Agricultural Engineers, *Oliver B. Zimmerman*
American Society for Testing Materials, *E. J. Edwards*
American Supply and Machinery Manufacturers Association, *C. F. Newpher*
American Transit Association, *Clarence W. Squier*
Association of American Railroads-Engineering Division-Construction and Maintenance Section-Iron and Steel Structures Committee, *Philip G. Lang, Jr., O. E. Selby (alt.)*
Association of American Railroads-Engineering Division-Construction and Maintenance Section-Rail Committee, *J. V. Neubert, J. B. Myers (alt.)*
Association of American Railroads-Mechanical Division, *J. McMullen, C. B. Smith*
Farm Equipment Institute, *Oliver B. Zimmerman*
National Electrical Manufacturers Association, *Thomas G. Crawford, Frank T. Wheeler*
National Machine Tool Builders Association, *S. F. Newman*
Society of Naval Architects and Marine Engineers, *H. P. Frear*
Telephone Group, *T. W. Ragan, J. R. Townsend*
U. S. Navy Department, *Theodore D. Ruddock, Jr.*
U. S. Navy Department, Bureau of Construction and Repair, *Officer in Charge*
U. S. War Department, *Steven L. Conner*
Manufacturers Representatives, Machine Screws, *J. S. Black, Edwin H. Ehrman, Glen Wayne, E. M. Whiting*
Manufacturers Representatives, Rivets, *C. P. Diemer, H. C. Weidner*
Manufacturers Representatives, Wrenches, *Hugh Aikman, Fred C. Billings*
Members-at-Large, *Bancroft G. Braine, D. L. Braine (alt.), Elwood Burdsall, John S. Cochran, Albert C. Danekind, J. H. Edmonds, W. P. Acres (alt.), Robert Faries, Herman Koester, R. S. Mast, W. J. Outcalt, W. A. Purtell, W. C. Waldo*

International Committee Studies Tire Standards

Fifty delegates from nine countries—Austria, Belgium, Finland, France, Germany, Great Britain, Italy, the Netherlands, and the United States—attended a meeting of Technical Committee 31 on Tires, Rims, and Tire Valves of the International Standards Association at London, July 19 to 23.

R. T. Brown, the Goodyear Tire and Rubber Company, Akron, Ohio, and H. A. Brittain, Goodyear Tyre and Rubber Company, Ltd., Bushbury, Wolverhampton, England, were members of the American delegation.

The following subjects were considered:

Private cars—
- Well base rims not exceeding 16 in. diameter
- Well base rims 17 in. diameter and over
- Size and location of valve hole for given tire and rim fitments
- Maximum cross sectional dimensions of tires fitting rims not exceeding 16 in. diameter
- Loads and inflation pressures
- Rubber valves

Commercial vehicles—
- Loads and inflation pressures
- Flat base rims 16 in. diameter and over
- Maximum cross sectional dimensions of tires fitting rims 16 in. diameter and over
- Size and location of valve hole for given tire and rim fitments

Motorcycles and bicycles—
- Rims, tires, and valves for motorcycles
- Rims, tires, and valves for bicycles

The meetings were preceded by a visit to the Research Laboratory of the Institution of Automobile Engineers arranged by the Society of Motor Manufacturers and Traders which acts as the secretariat of this technical committee.

Lieutenant-Colonel McLagan, secretary of the Society of Motor Manufacturers and Traders, Ltd., acted as chairman of the meeting.

Zimmerman on ASA Board; Named by Steel Institute

R. E. Zimmerman, vice-president, United States Steel Corporation, has been named by the American Iron and Steel Institute as its nominee for membership on the American Standards Association's Board of Directors, and has been elected to membership by the Board.

Mr. Zimmerman, who is in charge of metallurgy and research at the U. S. Steel Corporation, has been vice-president since 1933. He started his career as instructor of physical chemistry at the Massachusetts Institute of Technology in 1911, and since that time he successively held the positions of research associate, assistant director, acting director, director, and assistant to the vice-president of the American Sheet and Tin Plate Company until he joined the staff of the U. S. Steel Corporation as assistant to the president in 1932.

The American Iron and Steel Institute became a Member-Body of the American Standards Association in 1934, and a group member in 1935. Through its group membership, the Institute gives the services of the American Standards Association to its company members.

Blackstone Studios

R. E. Zimmerman

U. S. Steel Corp. vice-president is newest member of American Standards Association Board

Underwriters' Approval Required On Government's Electrical Supplies

The Federal Specifications Executive Committee has instructed all chairmen of technical committees to include in Federal Specifications, whenever applicable, the requirements of Underwriters' Laboratories, Inc., as regards fire and casualty hazards. The Comptroller General's office has approved this inclusion of the requirements of Underwriters' Laboratories, Inc., including their label, as satisfying part of the requirements of such Federal Specifications. The following statements will hereafter form a part of Federal Specifications for products inspected and labeled by Underwriters' Laboratories, Inc.

The new ruling reads:

"The bidder shall submit proof that the material or appliance he proposes to supply under this specification conforms to the standards of the Underwriters' Laboratories, Inc., as regards fire and casualty hazards. The label of the Underwriters' Laboratories will be accepted as conforming with this requirement.

"In lieu of the label, the bidder may submit independent proof satisfactory to the purchasing agency that his material or appliance conforms to the published standards, including methods of test, of the Underwriters' Laboratories.

"Compliance with the above preliminary requirements as regards fire and casualty hazards does not absolve the bidder from complete compliance with the other requirements of this specification in order to secure the acceptance of his material or appliance."

This provision will be included in future Federal Specifications.

New Canadian Standards Received by ASA Office

Three new Canadian standards have been received by the American Standards Association:

Construction and test of Christmas-tree and other decorative light outfits (C.E.S.A. C22.2-No. 37-1937)
Construction and test of receptacles, plugs, and similar wiring devices (C.E.S.A. C22.2-No. 42-1937)
Construction and test of lamp-holders having socket screw-shells (C.E.S.A. C22-2-No. 43-1937)

These standards are sections of the Canadian National Electrical Code. Copies may be ordered through the American Standards Association.

New Requirements, Use of Standards Feature New York's 1937 Building Code

by

George H. McCaffrey

Director of Research, Merchants' Association of N. Y.

IN May, 1928, Mayor Walker of New York City, having ascertained from the department heads concerned with the building industry that the existing building code adopted in 1915 and 1916 was, in their opinion, obsolete, requested The Merchants' Association of New York to undertake the preparation of a new code on the ground that the City departments had neither the personnel, the expert technical knowledge, the money nor the time to perform that task, while The Association, as an outstanding civic body enjoying general public confidence and support, could do so.

The Association agreed, and under the supervision of a small coordinating committee, set up 19 technical committees composed of 125 outstanding architects, engineers, contractors, and other experts in various branches of the industry to do the actual drafting. As drafts of the various sections were completed they were submitted to representatives of the City departments for review and discussion; and also to an Advisory Committee of 250 persons representing various technical, professional, civic and labor organizations.

The Merchants' Association presented its findings to Acting Mayor McKee in November, 1932. They were transmitted by him to the Board of Aldermen, which referred the matter to its Committee on Buildings. Public hearings were held in 1933 and again in 1935, in which the code was thoroughly discussed. Political obstructions developed which had little to do with the merits of the code, and it was not until July 20, 1937, that the energy, persistence and ability of the Committee Chairman, Alderman Edward J. Sullivan, finally carried the ordinance through the Board of Aldermen. Mayor LaGuardia signed the code a few days later.

Method of Approach to the Revision

The old code did not contain technical provisions in regard to elevators, plastering, plumbing, standpipes and sprinklers, and its arrangement was otherwise illogical and confusing. It was decided, therefore, to prepare an entirely new code based on the uniform arrangement suggested by the Federal Department of Commerce,[1] and using the decimal system of notation, rather than to attempt amendment of the existing ordinance. The outstanding advantage of the decimal system of notation is that the mere citation of a section number readily identifies the subject matter. It also is very easy to add or omit sections without upsetting the logical arrangement. There was considerable criticism of this system in the early stages of the work, but during the process of discussion its value became clear and the objections died out.

Contents of the Code

The new code contains a few introductory sections and 16 articles. It would be impossible within the allotted space even to list the many improvements which will result from the new code, but a general discussion of some of the salient features should be sufficient to indicate its general nature.

Article 1—Definitions—The old code had about one page of definitions in Article 1 and others scattered almost at random throughout its 250-odd pages. In the new code practically all definitions, except those dealing with the technical side of plumbing and elevators, are brought together and stated in clear, concise English in

[1]This arrangement was the basis of the recommendations recently adopted by the Building Code Correlating Committee of the American Standards Association. Copies of the committee's recommended arrangements (CB 25, April 5, 1937) can be obtained from the ASA.

Lionel Green photo

Article 1. For convenience the plumbing and elevator definitions are placed at the beginning of the articles dealing with those subjects.

Article 2—Administration—Broadly speaking the administrative provisions of the old code had been found satisfactory and few changes were made in them.

One important addition imposes responsibility for conformity with the code upon anyone filing plans for constructing buildings. Under the old code anything which could "get by" a plan examiner or field inspector was considered legitimate by some people. Officials could not catch every departure from the code, particularly during a building boom.

The new code requires, on work costing more than $10,000, that an architect or engineer file an affidavit with the plans stating that they comply with the code, except as specifically noted. Before a certificate of occupancy can be granted another affidavit must be filed by an architect, engineer or foreman who supervised the construction work, stating that the structure has been built in accordance with approved plans.

Article 3—Classifications—The two important changes in this articles are, first, that the classification of structures by types of construction is based primarily on the results of standard fire tests.[2] The requirements for materials are stated in terms of the number of hours which the walls and steel protection must be able to resist this standard test. The way is thus left open for the use of any material or type of construction which can meet these requirements.

The other important change is to permit a new type of construction intermediate between the five or six-story tenement with masonry walls and wooden beams and the fully fireproof building. This type is called Class 2, Fire Protected. It will be built entirely of incombustible materials, but recognizing that less protection of the steel skeleton is necessary in an apartment house containing household furniture than in a warehouse full of highly inflammable materials the amount of fire protection is considerably less than in a fully fireproof building. The new type can be built 9 stories or 100 feet high, thereby reducing the ground rent per room, which is an important factor in New York City, and the new structure will be much more durable than those built of masonry and wood.

Article 4—General Building Restrictions—The fire limits under the old code were hopelessly out of date. A distinct relationship was found between the need for fire limits and zoning for use. It was, therefore, decided that the fire limits should include the whole City, except the D, E and F residence districts and certain specific areas where the present zoning is out of harmony with actual conditions. As the zoning of various areas changes in the future the fire limits will automatically be extended or contracted in conformity.

Article 5—Ventilation—In dealing with the subject of ventilation it was necessary to depart

[2] American Standard Fire Tests of Building Construction and Materials (ASA A2-1934; A.S.T.M. C19-33).

radically from the old code and to do some pioneer work. The ventilation requirements of the old code were based upon the percentage of carbon dioxide in the air. After considerable study a simple practical means of determining whether mechanical ventilation would be necessary, and if so how much, was worked out in the form of an Index for Ventilation based upon the cubical contents per person, the floor area per person, and the window openings. This index makes it easy to determine the degree of ventilation necessary for any space. The amount required is the maximum necessary to provide for reasonable conditions, but is generally lower than would be provided by any competent engineer.

Article 6—Means of Egress—The egress requirements of the old code were fundamentally faulty in that they were based upon the number of people indicated as occupants on the plans and were so drastic that to comply with them would require a prohibitive amount of space for stairways, particularly in such structures as large hotels.

Smoke Hazard

In a modern fireproof building the danger from spread of fire is relatively slight, but the danger from the smoke hazard is very real. It was, therefore, decided that everything possible should be done to check the smoke hazard long enough to permit evacuation of a building.

The fire underwriters have done much valuable work in developing fire resistive doors, but some of their approved doors, while offering an effective bar to the passage of flame, would permit the passage of smoke and gas in such quantities as to make breathing impossible within a short time. Modern fireproofed wood doors are available which will exclude smoke and gas for at least an hour. Provision was, therefore, made for the use of such doors along exit passageways and stairways.

Article 7—Materials, Loads and Stresses

Standard Specifications—As a general proposition the old code requirements as to thickness, weight and strength of materials were on a rule-of-thumb basis. The new code substitutes for them the standard specifications of the American Society for Testing Materials or those of similar nationally recognized bodies wherever possible. It also opens the way for the use of any new materials or methods of construction which can meet specific strength requirements on the basis of standard tests.

Loads and Unit Stresses—Live load requirements have been revised downward in accordance with the advances in technical knowledge. The old code required provision for a wind pressure of 30 pounds per square foot in tall or very narrow buildings, but this could be provided in any way the designer chose. The result was that most of this load was *assumed* to be carried in the masonry walls and very little provided for by additional steel members. The new code reduces the required provision for wind load to 20 pounds per square foot but requires that definite provision for all of this be made in the steel skeleton.

The unit steel stress was increased from 16,000 to 18,000 pounds in accordance with the usual practice throughout the country. The need for this change was so great that it was adopted as an amendment to the old code in 1930. Its value is indicated by the fact that the change reduced the cost of structural steel by about a half million dollars in the Empire State Building.

Reinforced Concrete—Recognizing the great improvements in reinforced concrete construction the new code permits the use of controlled concrete under careful supervision and permits the use of substantially increased stresses by this method.

Lumber Stresses—Since the old code was adopted the types of lumber used in the New York market have changed considerably. The old code, in effect, treated all grades of lumber alike. The new code not only provides specifically for these new types of lumber but also puts a premium on the use of high grade timbers by permitting heavier working stresses when such timbers are used.

Foundations—Experience with foundations in New York indicates clearly the necessity of adequate knowledge of the underlying soil, particularly when a heavy structure is to be erected. The old code was inadequate in this respect. The new code not only puts this matter on a reasonable basis but gives a premium in the form of an increased allowable load when foundations are carried to greater than normal depths.

Article 8—Construction—The new code will permit the use of fusion welding in New York City for the first time in place of riveting or bolting. Such use, however, is carefully restricted by provisions governing the qualifications of the workmen, the design and supervision of the welding.

Pile Foundations—The requirements for pile foundations are much more carefully worked out in the new code, and the provisions are generally liberalized and safeguarded.

Masonry—With respect to masonry, more types of construction are recognized and the provisions are drawn on the basis that in skeleton type buildings the walls have no load carrying function and, therefore, serve only as protection against weather and fire. Instead of requiring arbitrary thicknesses of masonry, the requirements are based upon providing the necessary fire protection and considerable economies should result.

The way is also left open for the introduction of new methods of fireproofing and weather protection, which there was no inducement to develop under the old code.

Wood Frame Construction—The requirements for wood frame construction have been changed so as to check some of the worst practices of jerry builders in this type of building, and to provide for sounder and safer construction. Some of these provisions may result in a slight increase in cost, such as the requirements for firestopping at each floor and for diagonal sheathing. These were included deliberately on the ground that the greater durability and safety of the structure would more than offset the slight increase in the initial cost of the safer construction.

Standard, Up-to-Date Requirements Goal of ASA's Building Committee

A far-reaching national program to provide standard recommendations for the use of municipalities in adopting their building regulations is going forward under the Building Code Correlating Committee of the American Standards Association.

Committees are now working on standard building code requirements for fire protection and fire resistance; chimneys and heating appliances; light and ventilation; fire-extinguishing equipment; excavations and foundations; iron and steel; and administrative requirements.

An advisory committee of engineers of national reputation and wide experience with building materials and building construction has been organized to help the Correlating Committee determine what working stresses for building materials can be considered proper and consistent with public safety and economy. Data from tests on full-size samples of construction in masonry, steel, and other building materials are now being summarized and tabulated for the use of the advisory committee.

Members of the Building Code Correlating Committee represent outstanding national organizations interested in building regulations. They are:

R. P. Miller, American Society for Testing Materials, American Society of Civil Engineers, *Chairman*

G. N. Thompson, U. S. Department of Commerce, National Bureau of Standards, *Vice-Chairman*

H. M. Lawrence, American Standards Association, *Secretary*

J. H. Courtney, American Standards Association, *Technical Secretary*

American Institute of Architects, *Theodore I. Coe (alt.), J. Andre Fouilhoux, Mellen C. Greeley, H. R. Dowswell (alt.)*

American Municipal Association, *William Parr Capes, Albert H. Hall (alt.)*

American Public Health Association, *A. E. Gorman, W. Scott Johnson (alt.)*

American Society for Testing Materials, *Rudolph P. Miller, R. E. Hess (alt.)*

American Society of Civil Engineers, *Rudolph P. Miller, Melvin S. Rich (alt.)*

Associated Factory Mutual Fire Insurance Companies, *F. T. Moses, Arthur L. Brown (alt.)*

Associated General Contractors of America, *Daniel T. Webster, William J. Goble (alt.)*

Building Officials Conference of America, *Edward W. Roemer, Frank C. Keller (alt.)*

Federal Housing Administration, *Miles L. Colean, A. C. Shire (alt.), Howard P. Vermilya (alt.)*

International Association of Governmental Labor Officials, *Herman B. Byer*

National Association of Building Exchanges, *Emil Diebitsch*

National Association of Real Estate Boards, *Herbert U. Nelson*

National Board of Fire Underwriters, *W. E. Mallalieu, C. T. Bissell (alt.)*

National Fire Protection Association, *Franklin H. Wentworth, R. S. Moulton (alt.)*

National Safety Council, *F. A. Davidson, W. D. Keefer (alt.)*

Pacific Coast Building Officials Conference, *David H. Merrill, Walter Putnam (alt.)*

U. S. Department of Agriculture, Forest Products Laboratories, *J. A. Newlin, L. J. Markwardt (alt.)*

U. S. Department of Commerce, National Bureau of Standards, *George N. Thompson, Vincent B. Phelan (alt.)*

U. S. Treasury Department, Bureau of Public Health Service, *R. R. Sayers, J. M. DallaValle (alt.)*

U. S. Treasury Department, Procurement Division, *C. W. Chamberlain, H. H. Waples (alt.)*

Members-at-large, *W. H. Crowell, Albert Kahn*

Article 9—Precautions During Building Operations—The protection of adjoining property during construction operations is a difficult subject to cover in a building code because of the possibility of violating the property rights of an adjoining owner. The new code provisions offer an inducement to the owner of adjoining property to permit a contractor to enter upon his premises in order to provide reasonable protection. If an owner refuses such access to a contractor he is deprived from any special rights under the Building Code and must resort to the courts for his protection.

Article 10—Fire Resistive Construction—The method of basing fire resistive requirements upon the time which materials can meet the standard fire test has been described above.

Other important features of this article are a test for roofing which would eliminate many of the highly inflammable types without barring the common tar and gravel roof. The use of thin veneers is permitted, and the provisions regarding wooden floors and untreated wood trim have been liberalized.

Article 11—Heating Appliances, Combustion and Chimneys—The new code strikes the smoke nuisance at its source by requiring design to insure proper combustion. Careful attention is given to the design of incinerators.

The requirements of the new code in this article substantially agree with those of the fire underwriters. This should mean some saving in insurance premiums and eliminate friction between City officials and insurance companies.

Article 12—Special Occupancy Structures—New York's preeminence in the theatrical business is seriously threatened because so few theatres have been profitable in recent years. The old Building Code requirements are responsible for this condition in a considerable degree. The new code will help the situation by permitting the erection of offices, hotels or apartments above the auditorium section of a theatre, and changing the level of the auditoriums so that the valuable ground floor space can be used for commercial purposes, provided the theatre portion of the building is separated from the other parts by unpierced fire walls. Other provisions will give greater flexibility in the design and economical use of theatre property.

Article 13—Elevators—The elevator code of New York in 1929 was so obsolete that the most efficient and modern types of elevators could not legally be installed and used economically. The construction of several large buildings was being held up because they could not be economically operated under the old code. The technical elevator provisions of the new code were, therefore, adopted in 1931 ahead of the other articles.[3] The outstanding feature of these provisions is the emphasis upon safety. They have been found practical and satisfactory as a whole in operation.

Article 14—Plumbing and Gas Piping—The problem to be solved in preparing the plumbing and gas piping sections was that of preparing requirements which could be applied to any building from one to one hundred stories tall and from a seashore shack to a palatial hotel. The new code brings up to date the requirements of the old which was really intended to cover buildings up to twenty stories in height. Perhaps the most important specific change is the method of determining the required size of soil, waste and vent pipes. Each fixture is given a certain value in fixture units, depending upon the quantity and rate of discharge from it. A lavatory is thus valued at one fixture unit and a watercloset at six. The required size of a drain, main or vent is determined by the sum of all the fixture units connected to it. This method should simplify both the work of laying out plumbing systems and that of checking plans.

Article 15—Sprinkler Systems; Article 16 — Standpipe Systems—The sprinkler and standpipe system requirements were drawn to bring about better standardization with consequent reduction in the cost of installation and to eliminate conflicts between the municipal requirements and those of the insurance rate-making bodies. Their adoption should result in considerable simplification and economy.

Conclusion

The new code becomes effective January 1, 1938. The manner of its preparation is an interesting and outstanding example of constructive cooperation between a responsible civic organization and the municipal authorities. In general it is characterized by the substitution of precise scientific requirements for rule of thumb methods and by the placing of premiums upon the use of high grade technical skill and knowledge in place of restricting the use of materials by large factors of safety in order to protect mediocrity from its own shortcomings. Its application in the largest city in the country will be watched with great interest, not only by those experts who had a hand in drafting it, but also by the building industry at large.

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[3]The American Standard Safety Code for Elevators, Dumbwaiters, and Escalators was used in setting up the provisions of the New York City building code.

Broadcast From Station S.A.M.[1]

ELEVEN o'clock, national standards time. This program comes to you from station S.A.M. over the red, white, and blue network presenting another series of reasons why you just cannot afford not to have STANDARDS—spelled: S-t-a-n-d-a-r-d-s. Ask the man who uses them. He'll tell you: "They satisfy. Not a headache in a carload of executives. Engineers cry for them—and to purchasing agents they impart that gentle mood you love to get in touch with. Keep that business connection".—

Friends of the S.A.M. radio hour: Do your production men wear out their soles by commuting between the shop and the engineering department to quibble about manufacturing limits?

Do you occasionally find your chief engineer and your sales manager engaged in a fierce round of jiu-jitsu to decide what your customer really wants?

Is the steel strip you get sometimes so hard that you could shave with it, and at other times so soft that you might knot it into a necktie?

Would you like to wipe out some of the 5700 varieties you are making now—from thimbles to steamshovels, or from lipsticks to firebricks?

Are you becoming a nervous wreck by going daily into a huddle with your staff to keep up the pace with the kaleidoscopic changes in your customers' demands?

And in spite of all this — does your lawyer carry off a juicy slice of your company's profits for saving its surface—but not all—in constant litigation with suppliers and customers, due to sheer lack of definite specifications of what you buy and sell?

Are you longing for a more abundant leisure life?

Of course, you are.

And here is what you should do.

Just hop into your car and get yourself a standards department from the nearest specialist. Ask for the label in gold and purple letters: FLEXIBLE COORDINATION. Refuse imitations. Only a standardizer can build standards. Look for the inscription on the back: "This department reports only to the executive management." No other package contains the genuine product.

Take out a standard and put it into your business. Watch it dissolve with that clarity which is the hallmark of sound management. See how its benefits penetrate your entire organization. Enjoy that delightful feeling of having a system take care of your routine matters, and save your pep and punch for new undertakings. Watch the worries go by. Note the marvelous slenderizing effect on your company's waste line. And by the time you have finished your first set of standards, there will be that solid increase in the black color of your ledger which is so irresistible to the hearts of your shareholders.

Once you have got the taste of standardization, you will never want to part with it again. The flavor lasts, and so do the benefits. Do not wait. Get your standards department NOW. Only one out of fifty companies has one. Be ahead of your competitor. And do not forget to look for the label: FLEXIBLE COORDINATION.

This talk has come to you through the courtesy of the *S.A.M. Bulletin*. Your announcer: JOHN GAILLARD.

[1]This imaginary radio talk, reprinted from the June, 1937, issue of the *Bullletin* of the Society for the Advancement of Management, was written in a light vein for a serious purpose—to "sell" the advantages of a standards department in an industrial concern.

Canadian Fuel Oil Standards To Be Effective October 31

Specifications for six different grades of fuel oil, issued as tentative in October, 1936, by the Canadian Government Purchasing Standards Committee, are expected to become final on October 31, 1937.

Flash point, sulphur, pour point, water and sediment, carbon residue, ash, distillation temperatures, and viscosity are some of the points covered for each grade.

Methods of sampling and tests must be in accordance with standard D270-33 of the American Society for Testing Materials.

The specifications apply to hydrocarbon fuel derived from petroleum for use in various types of domestic and industrial oil-burner equipment.

Inquiries about the standard should be addressed to the Secretary of the Canadian Government Purchasing Standards Committee, National Research Council, Ottawa, Ontario.

American Shrinkage Standard Basis for International Work

The American Standard Method of Test for Shrinkage and Laundering of Woven Cotton Cloth (L5-1936; A.S.T.M. D39-36) is used by testing laboratories not only in the United States but all over the world, according to a statement by S. Schofield, manager of the Sanforizing Service, Manchester, England, to *the Manchester Guardian*, July 2.

"Our Sanforizing licensees throughout the world use that formula for predetermining shrinkage of washable cottons, and, working quietly behind the scenes, they have been preparing the way steadily for official recognition of similar standards in other countries," says Mr. Schofield.

"It may be hoped that the efforts of the Textile Institute to establish such a standard, in cooperation with the British Standards Institution, will bear early fruit. The British Launderers' Research Association has led the way with their new 1936 specification of shrinkage, which wiped out the anomaly that a cloth could be considered fully shrunk even though quite a large potential width shrinkage was left in the material. The B.L.R.A. official specification now stipulates complete shrinkage, in both width and length, allowing only a maximum tolerance of ¼ in. per yard."

The American Standard test method was first developed in the United States by the American Association of Textile Chemists and Colorists as one phase of their research in textile technology. Later, recommendations by the National Bureau of Standards, the A.S.T.M. Committee D-13 on Textiles, the Laundryowners National Association of the United States and Canada, the National Retail Dry Goods Association, and other interested bodies led to its general adoption.

Nationally Representative Committee Coordinates ASA's Mechanical Projects

About one-fourth of the 379 completed American Standards are of special interest to manufacturers because they have a direct bearing on the efficient operation of a manufacturing plant. Standards for dimensions, quality of materials, methods of sampling and testing, safety measures all contribute to efficiency and economy. Toothpaste, textiles, or car wheels need mechanical equipment to transform raw material to finished product.

Various interests in mechanical standards of 20 different groups are coordinated through the new American Standards Association's Mechanical Standards Committee:

Alfred Iddles*, American Society of Mechanical Engineers, *Chairman

F. H. Morehead*, Manufacturers Standardization Society of the Valve and Fittings Industry, *Vice-Chairman

John Gaillard*, American Standards Association, *Secretary

American Foundrymen's Association, *LeRoy M. Sherwin*

American Gear Manufacturers Association, *B. F. Waterman, T. R. Rideout (alt.)*

American Institute of Bolt, Nut and Rivet Manufacturers, *John S. Davey*

American Iron and Steel Institute, *Charles M. Parker*

American Society for Testing Materials, *Harold H. Morgan, R. E. Hess (alt.)*

American Society of Mechanical Engineers, *Alfred Iddles, Walter Samans (alt.)*

American Transit Association, *Frank T. Ward, Frank E. Seeney (alt.)*

Association of American Railroads, Mechanical Division, *W. I. Cantley, J. E. Ennis (alt.)*

Electric Light and Power Group, *Edwin B. Ricketts, A. Maxwell (alt.)*

Grinding Wheel Manufacturers Association, *A. Rousseau*

Heating, Piping, and Air Conditioning Contractors National Association, *H. M. Hart*

Manufacturers Standardization Society of the Valve and Fittings Industry, *F. H. Morehead, A. M. Houser (alt.)*

National Electrical Manufacturers Association, *Frank Thornton, Jr., L. F. Adams (alt.)*

National Machine Tool Builders Association, *F. O. Hoagland*

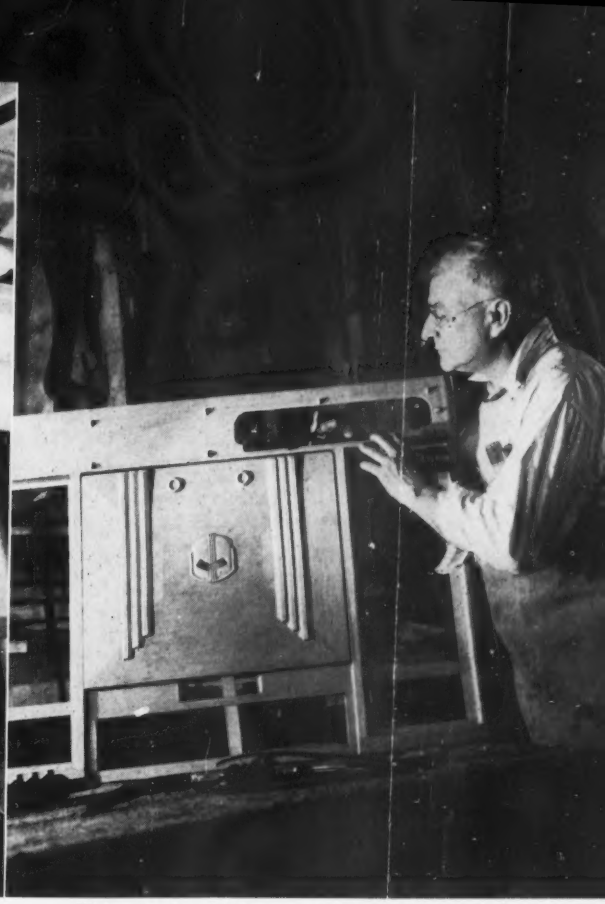
Society of Automotive Engineers, *Clarence W. Spicer, A. M. Wolf (alt.)*

Telephone Group, *David Levinger, A. O. Avery (alt.)*

U. S. Department of Commerce, National Bureau of Standards, *I. J. Fairchild, H. L. Whittemore (alt.)*

U. S. Navy Department, *Officer in Charge, Bureau of Engineering, Specification Section, Design Division; Officer in Charge, Bureau of Ordnance, Design Section (alt.)*

U. S. War Department, *Steven L. Conner*



Photos by Gerald Young. Courtesy Mechanical Engineering

This conveyor for tubes to be cut into oatmeal cartons is held together by American Standard bolts and nuts

In a stove factory — the American Recommended Practice, Foundry Patterns of Wood, supplements the skill of the craftsman

This Mechanical Age

by

John Gaillard

Mechanical Engineer
American Standards Association

American Standards Speed Production – Create Interchangeability – Make Plants Run More Smoothly

"HAVE any American Standards been set up for the things we are making?" is a question frequently asked of the American Standards Association. In some cases, the answer must be: "No—but do you realize how many American Standards are involved in making your product?"

A few years ago, when plans were made for the organization of the Mechanical Standards Committee of the ASA, the question arose what organizations should be invited to be represented on it.

The first thought was to include, as a matter of principle, all manufacturers and users of mechanical equipment. But it appeared at once that we

might then just as well invite American industry as a whole—and ultimate consumer groups as well.

So a definition of the mechanical industry was developed and approved by a conference of prominent groups in the mechanical industry, to be used as a "gage" in selecting the MSC membership—with a liberal tolerance on admittance of any group vitally interested in mechanical problems and willing to take an active part in the MSC work.

Thus, the American Society for Testing Materials was invited, and is now represented on the MSC, because of its prominent position in the development of specifications for materials many of which affect the mechanical industry, even though other problems in this field, such as the establishment of standard pressure ratings for flanges and fittings, are not within the scope of ASTM work.

The development of the "gage" for MSC membership brought out clearly how far the benefits of American Standards in the mechanical field penetrate the structure of industry as a whole. In general, three main divisions in every plant are affected. First, there is the generation and mechanical distribution of power—including pipe lines for steam, compressed air, gas and water under high pressure. Second, we have the production equipment, varying with every type of manufacturing industry, but for the major part a product of the mechanical industry itself. And third, most plants have various types of transportation facilities—conveyors, elevators, cranes, and again, pipe lines for materials in liquid, gaseous, and powder form.

Take a chemical plant, for example. There may not have been set up as yet a single American Standard for the product it makes, or for the materials it uses. But just come down for a moment to the boiler room. Here is a pipe line for steam of 900 lb pressure, built in compliance with the code for pressure piping and consisting of steel pipe, flanges and fittings, all made to American Standards. So are the bolts and nuts used for the flange connections as well as the screw threads cut on these bolts and nuts. And to indicate that the pipe line carries superheated steam—and not any

Standards at Work

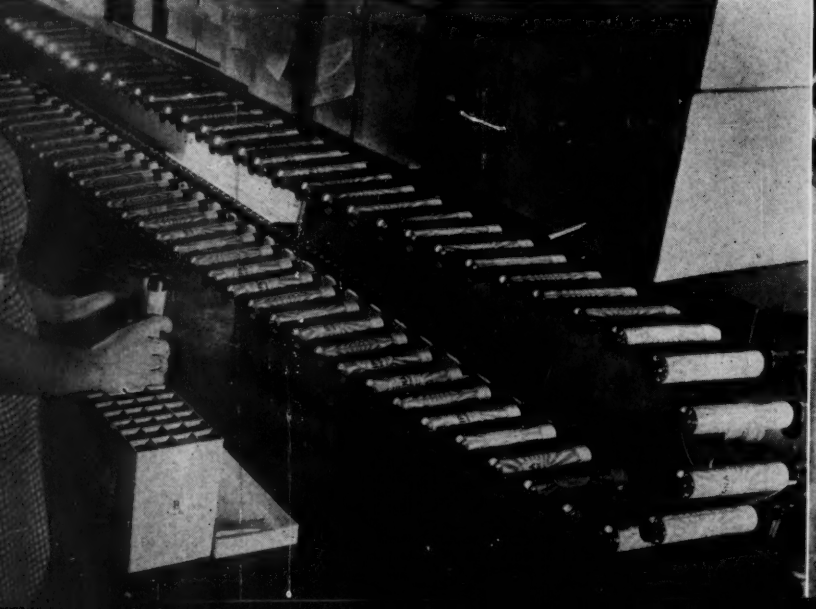
In every industry American Standards play a vital role—

in holding products to accurate dimensions and quality, and

in keeping manufacturing costs to the lowest possible level

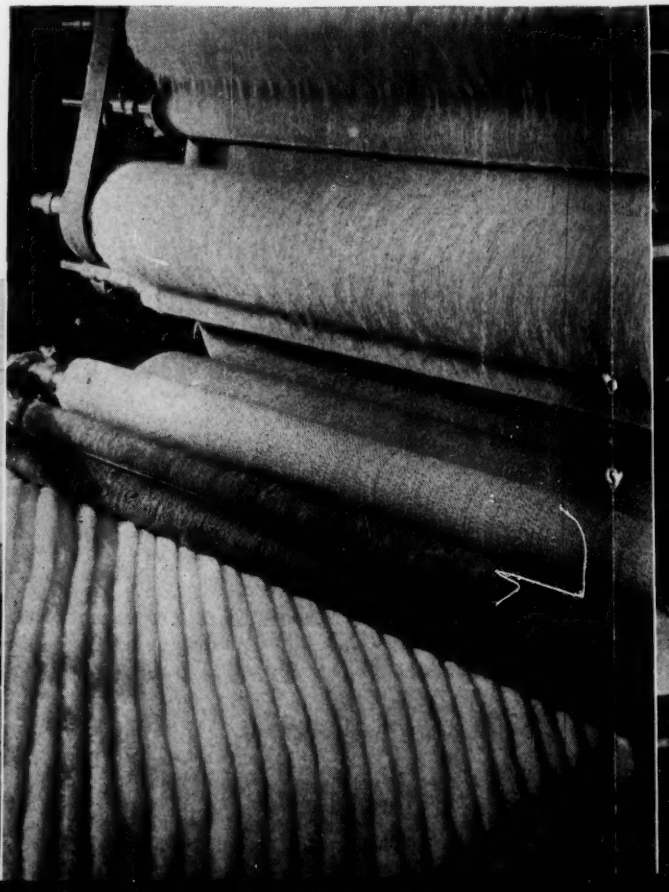
Whatever your product, its manufacture benefits in some way by the existence of American Standards

Rittase Photo. Courtesy Sherwin-Williams Co.



(Left). American Standard Roller chain maintains the rhythm of tooth-paste tubes. (Below). American Standard steel shafting is extensively used in the construction of textile machinery

Gera'd Young Photo



other fluid used in this chemical plant—it is marked by orange color bands with white-gray strips in accordance with the American Standard scheme for the identification of piping systems.

In the manufacturing department, we may find nothing but special equipment—too special to have national standards set up for it. Yet, the benefits of American Standards have been built into every unit. Here again we have a number of component parts: bolts, nuts, screws, ball bearings, gears, and shafting keys, for which American Standards exist.

Very often, this is given very little thought, just as it is taken for granted that we shall have electric light when we turn the switch, or water when we open the faucet. It just *is* there—but we would be much disturbed if suddenly it were not.

Do most manufacturers stop to think what it would mean if industry went back to the pre-ASA period, say some 30 years ago, when American Standards for such fundamental items as screw threads did not exist? At that time, one of the largest manufacturers of bolts and nuts in this country was still making his product by fitting the nuts to the bolts, or conversely—there was no interchangeability. Think what this meant to the problem of maintenance. Now, any bolt or screw provided with a specific American Standard screw thread will match, with a satisfactory fit, any nut or tapped hole made to the same standard—independent of the origin of the two parts.

The benefits of interchangeability pervade the entire field of mechanical equipment, whether it serves to make telephones, printed matter, cigarettes, or textile fabrics. It goes right down to the machine tools which form the basis of all mechanical production. A number of important American Standards for component parts of these "mas-

Grain conveyors will be made safer in operation by an American Standard now under development

Gerald Young Photo

The railroads, pioneers in standardization, have adopted many American Standards

Photos Courtesy Mechanical Engineering

ter tools of industry" have already been established as well as for cutting tools used in combination with them. Together with the splendid progress in the design of machine tools, interchangeability of their parts due to American Standards has been an important factor in supplying the user of mechanical equipment with better machinery and apparatus, at a lower price. Not to speak of the benefits he has derived indirectly from the research work undertaken in several cases by the machine tool builders before the American Standards were set up. And, incidentally, every manufacturer who has a maintenance department where machine tools are used, has a *direct*, instead of an indirect benefit from such standards.

A similar condition exists in regard to transportation equipment involving numerous parts made to American Standards. Ball bearings in rollers for belt conveyors, small rivets connecting the belts themselves, transmission shafting and the keys going with it, gears in speed reducers, and roller chains are cases in point. Here again, the savings in production cost due to American Standards are handed on to the user of the equipment.

And to all this we must add the incalculable benefits of safety codes developed under ASA procedure for use in mechanical operations. To mention only a few: there are widely used codes for grinding wheel practice, for mechanical power transmission, and for foundry work. Safety codes not only protect the worker's life, limb, and health; they also bring savings in dollars and cents to employe and employer alike. The safe workshop is the most efficient.

Standard Costing Shows Excessive Variety

A REDUCTION from 600 to 54 in the items manufactured, serviced, and stocked by the Aluminum Products Company was made possible by a standard method of compiling costs, says J. K. Matter, Aluminum Products Company.[1]

A Standard Cost, according to Mr. Matter, is "the cost of an article determined by computation of material costs, labor, and burden rates, all of which have been taken from predetermined standards."

"While we were determining the proper standard costs we also analyzed our product," Mr. Matter says. "We were somewhat appalled to discover that we were attempting to manufacture, service, and stock some 600 items. It didn't take a genius to convince us that this variety was entirely too great for our organization to handle. None of us could see our way clear to maintaining supplies of purchased and manufactured parts to keep each item alive.

"After careful study we found that many of the items could be eliminated. We found, for instance, that we were making 36 different one-quart sauce pans. Some had round beads and some had square beads; some handles were of tinned steel, some were of bakelite; some had straight sides while others had tapered sides. Each of these sauce pans would hold one quart; none of them would hold more than a quart.

"The axe was swung. When we were through, 600 items had been reduced to 54. We have found it enough.

"Our ground work had now been completed. The product, production, and labor rates had been standardized. Burden was fairly distributed. So we compiled our standard costs and put them into effect."

[1] "Standard Costs Kept Standard," *American Machinist*, July 14.

Revise Canadian Wire Standard

A complete revision of the standard for zinc-coated (galvanized) telegraph and telephone line wire has just been issued by the Canadian Engineering Standards Association, covering two types of wire—non-copper-bearing steel and copper-bearing steel.

Requirements for the respective resistivity of these two types of wire are given, and tables covering standard sizes, breaking strength, and mandrel sizes for wrapping test are also included.

Two Appendices cover methods of determining weight of coating (stripping test), and uniformity of coating (Preece test).

The specification was prepared by the Committee on Galvanized Telegraph and Telephone Wire of the Canadian Engineering Standards Association. The committee reports:

"The specification . . . is issued after careful study with the belief that it is up to date and will ensure satisfactory quality without imposing undue restrictions on the manufacturer."

Copies of C.E.S.A. C3-1937 may be ordered from the American Standards Association at 25 cents each.

ASA Represents American Industry At International Meetings

The national standardizing bodies of 17 countries, represented by 220 delegates, held a series of meetings organized by the International Standards Association in Paris, June 14 to 26. Austria, Belgium, Czechoslovakia, Denmark, Finland, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Poland, Sweden, Switzerland, and the United States were represented.

Problems of international standardization on the following subjects were discussed:

Aeronautics	Petroleum products
Automobiles	Pipe
Ball bearings	Preferred numbers
Belts and pulleys	Sieves
Coal	Sprinkler systems
Drawings	Standard diameters
Inland navigation	Steel and iron
Ocean navigation	Terminology
Machine tools	Tools
	Wood screws

The Council and the Plenary Assembly of the International Standards Association held their meetings following the technical conferences. Dr. Clayton H. Sharp, president of the U. S. National Committee of the International Electrotechnical Commission attended the Council meeting on behalf of the American Standards Association, and Cyril Ainsworth, assistant secretary of the American Standards Association, attended the Plenary Assembly.

C. B. Veal, research manager, Society of Automotive Engineers, was the authorized delegate of the American Standards Association at the meetings of ISA committee 20 on Aeronautics, 22 on Automobiles, and 28 on Petroleum Products.

Additional meetings held July 1, 2, and 3 resulted in setting up in the International Standards Association a new international committee on Acoustics. Dr. Harvey Fletcher, and Dr. Clayton H. Sharp represented the American Standards Association and American industry on this subject.

American industry has a voice in international standardization agreements through the fact that the American Standards Association is a member of the International Standards Association. Manufacturers whose products are competing in a world market find this representation particularly effective. The American Standards Association is represented on nine of the international technical committees in which American industry has a special interest, and keeps its members informed concerning the activities of the others.

More complete information about the results of the ISA meetings will be given in a future issue of INDUSTRIAL STANDARDIZATION.

Mueller Becomes Chairman Of Small Tools Committee

W. C. Mueller, manufacturing engineer, Western Electric Company, has been elected chairman of ASA committee on Small Tools and Machine Tool Elements (B5), to succeed C. W. Spicer, vice-president and chief engineer, Spicer Manufacturing Corporation.

Mr. Mueller represents the American Society of Mechanical Engineers. He has been a member of the committee since March, 1931, and is also chairman of the technical subcommittees on Twist Drill Sizes, No. 7; Forming Tools and Holders, No. 10; and Reamers, No. 20.

Mr. Spicer, who represents the Society of Automotive Engineers, resigned as chairman of the committee because he felt unable to give the necessary amount of time to the work. The energy and effort he brought to the committee's work from the time he took office in 1928 resulted in the completion of nine basic standards for small tools and machine tool elements. These are:

Toolposts and Tool Shanks (B5b-1929)
Milling Cutters: Nomenclature, Diameters, Thickness, and Other Important Dimensions (B5c-1930)
Taps: Cut and Ground Threads (B5e-1930)
Rotating Air Cylinders and Adapters (B5.5-1932)
Jig Bushings (B5.6-1935)
Circular and Dovetail Forming Tool Blanks (B5.7-1936)
Chucks and Chuck Jaws (B5.8-1936)
Lathe Spindle Noses (B5.9-1936)
Machine Tapers, Self Holding Taper Series (B5.10-1937)

Mr. Spicer will continue to serve as the chairman of the technical subcommittee on Splines and Splined Shafts, No. 13.

Railroad Mechanical Division Proposes Revised Standards

A report of proposed revisions to standard specifications of the Mechanical Division, Association of American Railroads, was published in the June 21 issue of *Railway Age*. A proposed new standard containing specifications for steel bars suitable for bolts, bushings, and general purposes is published in full.

Specifications in which changes have been suggested are:

Steel, boiler, and firebox, for locomotives M-115-34
Steel, structural, shapes, plates and bars M-116-34
Steel sheets and thin plates M-117-34
Truck bolsters, design test requirements M-202-31
Truck side frames, cast steel, design test requirements M-203-29
Iron and steel chain M-301-34
Refined wrought-iron bars M-302-34
Welded wrought-iron pipe M-306-34
Hose, air-brake and train air-signal M601-34
Hose, air, gas, and oxygen, wrapped and braided M-603-34
Hose, cold water, wrapped and braided M-604-34
Hose, steam and hot water M-605-34
Hose, tender tank M-606-34

The new standard specifications for steel bars cover commercial bar steels, hot-rolled and cold-finished, and cover both carbon- and alloy-steels of the grades in most general use.

London Advertising Association Suggests Standard Research Methods

The Council of the Institute of Incorporated Practitioners in Advertising, London, recently announced a new five-fold classification of research methods to aid in standardizing results of advertising investigations. The Research Committee of the Institute believes that standardized research methods will be invaluable to modern industries where a clear knowledge of possible markets is esential, according to an announcement of the Committee's report.

"The I.I.P.A., through its Research Committee, has endeavored to 'introduce order into chaos.'" says the report. "After consulting many different authorities and interests it has produced a five-fold breakdown of the population into social and income groups; it has defined the estimated income limits of these groups; it is advising the use of a related 'per capita' income classification compiled on the basis of a weighted consumption index according to age and sex of the members of the household.

"Once this new basis is adopted all those who are interested in marketing will be talking the same language, and the results of one piece of research will henceforward be comparable with those of others."

British Propose Standard Symbols, Abbreviations For Chemical Industry

A list of symbols and abbreviations for use in the chemical industry has been prepared by the British Standards Institution and is being circulated in draft form before being considered for approval as British Standard.

This list, which if approved by the British Standards Institution will be widely used throughout the British Empire, is based on the symbols and abbreviations adopted by the Chemical Society and the Bureau of Chemical Abstracts of Great Britain. It also includes standard engineering symbols and abbreviations used in the chemical industry.

The draft includes nine sections covering symbols and abbreviations for:

Primary units
Mathematics
Greek Alphabet
Heat and Thermodynamics
Electricity and Magnetism
Optics
Elements
Organic Radicals
General engineering terms

Copies of the draft standard have been received by the American Standards Association Library, and may be borrowed or ordered.

ASA Withdraws Approval Of Aeronautic Safety Code

The Aeronautic Safety Code, approved by the American Standards Association in 1925, has been withdrawn as an approved standard by the ASA Standards Council. This action was taken at the request of the Society of Automotive Engineers, which has administrative responsibility for the project, with the consent of the Aeronautical Chamber of Commerce and the aeronautic industry.

The rapid developments in aeronautics since 1925 have made the code obsolete, and withdrawal of ASA approval leaves the way clear for a new code whenever such action seems desirable.

Proposed Legislation Would Legalize Standard Inch-Millimeter Ratio

WHEN Congress adjourned August 21, it left among other unfinished business a proposal for fixing the legal weights and measures standards of the United States. The proposal, known as the Somers bill, had already been given a public hearing by a committee of the U. S. House of Representatives.

The feature of the bill which may be of most interest to American industry and members of the American Standards Association was its provision for legalizing the American Standard ratio between the inch and the millimeter in place of the present official ratio. The American Standard, which simplifies the legal ratio of 1 inch equals 25.40005 millimeters to 1 inch equals 25.4 millimeters, was adopted by industry and approved by the American Standards Association, in 1933.

In Great Britain, where the official relation between the inch and the millimeter is 1 inch equals 25.39998, the simplified ratio 25.4 was adopted by industry in 1930. Thus, industry in both countries decided to disregard for all practical purposes the minor difference between their respective official inch-millimeter ratios.

The rest of the world has also welcomed the simple industrial ratio 25.4 which unifies American and British industrial practice and simplifies all international transactions involving length measurements. Sixteen countries have now adopted it.[1]

Dr. Lyman J. Briggs, speaking on the other features of the proposed legislation before the National Conference on Weights and Measures at its twenty-seventh annual meeting June 1 to 4, said:

"It will be evident from the wording of the proposed legislation that it is not in any sense a proposal to use the metric system in place of our present customary system of weights and measures.

"On the contrary, it is a proposal to establish legally the standards which define the weights and measures now in use. It uses for this purpose the platinum-iridium meter No. 27 and kilogram No. 20, because they are the best material standards of length and mass which this Government possesses.

"By defining the inch and the pound as certain specified fractions of the meter and the kilogram, we base our customary system of weights and measures on material standards that have been shown through the observations of the past 40 years to be highly stable and constant in value. But in so doing, we do not for a moment relinquish the units of our customary system of weights and measures. On the contrary, for the first time in the history of our country their values will be definitely established by this legislation."

The Conference endorsed the bill.

[1]Austria, Czechoslovakia, Denmark, Finland, Germany, Great Britain, Hungary, Italy, Japan, the Netherlands, Norway, Poland, Roumania, Russia, Sweden, Switzerland, and the United States have adopted the standard conversion factor, 25.4.

Hungarian Government Requires Compliance to National Standards

The Department of Industry in Hungary recently decreed that bids submitted to public authorities for certain goods must be based on standards approved by the national standardizing body in Hungary. Deviations from these standards are permitted only by special decision of the Minister of Industry.

There are now 110 approved Hungarian standards, which apply to such products as: cotton, asbestos, cement, rivets, picks, shovels, paper and paper products, ink, electric equipment for heavy current installations, and electric cooking and household appliances.

National Research Council Becomes Canada's IEC Group

The Canadian Committee of the International Electrotechnical Commission, originally under the auspices of the Canadian Engineering Standards Association, has been disbanded and the work has been taken over by the Electrical Committee of the National Research Council. The C.E.S.A. is represented on the Electrical Committee.

The United States National Committee of the IEC is organized under the jurisdiction of the American Standards Association.

Standards in Machine Shop Practice

From "the master tools of industry" to the most special production equipment — all benefit by American Standards

by

F. O. Hoagland

Master Mechanic, Pratt and Whitney Division, Niles-Bement-Pond Co.

STANDARD practices are greatly needed in machine shops today—they save time and money for the manufacturer and are a help to the customer. Many shops have established standards of their own, but the greatest benefit comes from standards that have been generally adopted in the practice of an entire branch or possibly several branches of industry. That's why a clearing house for standardization is so valuable to industry at large.

Such a clearing house is found in the American Standards Association. Already the ASA has shown what can be done in establishing national standards, and the National Machine Tool Builders Association and the American Society of Mechanical Engineers, in cooperation with the American Standards Association, have done much to introduce standards into machine shop practice.

Every machine shop, in order to obtain the full value of American Standards, should fit them to its particular requirements, just as a tailor fits a person when he buys a ready-made suit. That suit may not always be quite as nice as a suit of clothes made to order by a skilled tailor, but it will be a great deal better than a suit that a person would make himself and which he would probably be ashamed to wear in public.

Company Uses 70 Standards

I could mention here some 70 American Standards on widely varying subjects, all of which are of interest to our company. They apply not only to such typical machine tool items as lathe spindle noses, or milling cutters, but also to Portland cement; window cleaning (safety code); rotating electrical machinery; drinking fountains; and roller chains—to mention only a few.

At the Pratt and Whitney factory we are using the American Standard Preferred Numbers. We have even arranged the working tolerances we are using on a Preferred Number Series, advancing by 100 per cent. That is, the basic tolerance we are using in the Machine Shop is .001 in., arranged in geometric progression as follows: .0001 (25), .0002 (5), .0005, .001, .002, .004, .008, 1/64, 1/32, 1/16, ⅛, ¼, ½, 1. The amount of tolerance must be selected from this column and no other amounts—like .003, .005, or .007—are permissible. Exception is made, however, for mountings of ball and roller bearings where we use tolerances specified by the makers.

Ten years ago, approximately 75 per cent of the breakdowns of machine tools was due to frozen bearings; that is, improper lubrication. In our own case, we have succeeded in bringing this down to less than one per cent, and we have kept it down there. This trouble could not be cured simply by looking after the oil grooves and channels—we had to establish a standard practice in regard to allowances and tolerances on the

The flow of operations in the shop is made easier by standard practice

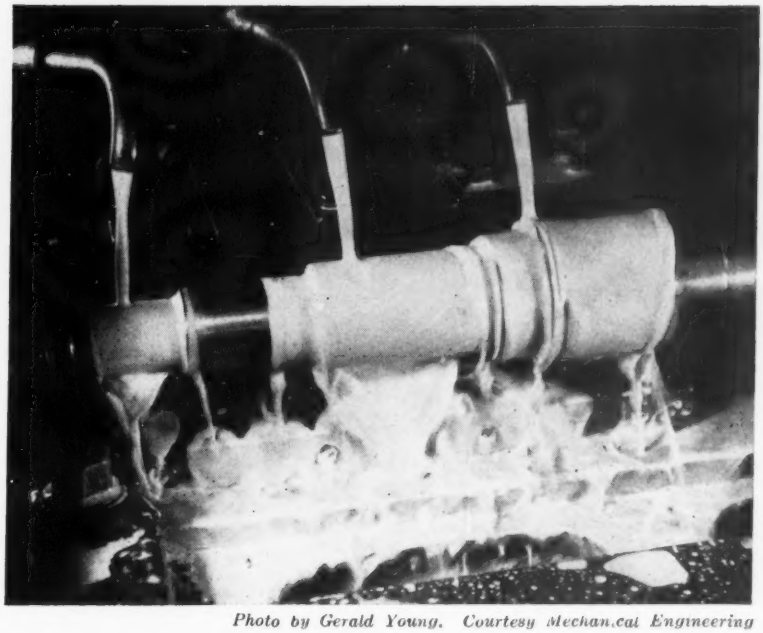


Photo by Gerald Young. Courtesy Mechanical Engineering

shafts and bearings in order properly to maintain the running fits. In this, the American Tentative Standard for Tolerances, Allowances, and Gages for Metal Fits has been quite helpful in machine tool practice. This standard is based on the Basic Hole System and tolerances are unilateral. That is, holes cannot be smaller than the basic size and the working tolerances are on the plus side only.

In machine tool building, where a great portion of the work is turned on arbors after the work has been chucked, it is desirable to have the hole large enough to permit the use of a standard arbor. The allowances required in order to obtain a running fit or a driving fit can readily be made on the shaft or the spindle, using the micrometer.

However, a basic shaft system should be added to answer the requirements of manufacturers using cold rolled shafting to a great extent. In this case, the holes must vary to suit the established limits of cold rolled shafting. This matter is now being given consideration by the committee on fits and gages of the American Standards Association.

Some time ago we asked the ASA to give consideration to the threads of lock nuts for ball bearings for some of the smaller sizes. The *SAE Handbook* gives threads for these lock nuts that have been found too fine for machine tool practice; they have a tendency to strip under load. We have, therefore, suggested that a coarser thread be adopted. The Mechanical Standards Committee of the American Standards Association has already given this request its attention, and has referred it to the ASA committee on Ball and Roller Bearings.

In the same way, every company should bring its standardization problems to the American Standards Association and take advantage of the work already done. If the standards already established do not fit your case, bring that to the attention of the ASA. Your request will be given attention and possibly something can be done about it when the standard is next revised.

It is just as important to keep an eye on a standard to watch if it needs revision as it is to establish it in the first place. There are very few cases where the standard for a manufactured product ranks so high that no improvement can be made after a certain length of time. We have a rare case in the violins made 300 years ago by Stradivarius, of Cremona, which have not yet been surpassed. But now that modern science has developed methods and apparatus for rating quality of tone, it may be that it will be possible to improve even a Stradivarius violin.

Finds Standards Engineers Important

A working definition of standardization might well be "an agreement to accept and be governed by a certain design and practice until a better one has been produced." Even if you agree with this, an important problem remains to be solved in introducing standards into practice—in your own shop, for instance.

It is no use to appoint a committee of superintendents and foremen to take care of this work—they generally meet to smoke and tell stories.

You must select a man with engineering and shop experience who can talk the language of the engineers and shop men—who has some ability—and who is tactful in his dealings with the men. The machine designer does not like to be told that there is a standard already established for that particular scheme he had in mind. Nor does the foreman in the shop like to be told how much to allow for a running fit in a spindle bearing that he has tinkered with for several years—hasn't he been filing and polishing the spindle bearings after they came from the grinder room, and does he not know that the only safe way is to cut and try?

Standardization is as much a human problem as it is a technical one. You must, therefore, train your standardization man for his work, and give him all the assistance he needs in order that he may keep ahead of the problems arising in the shop.

S.A.E. Proposes Standard For Trailer Couplings

Trailers will be hitched to passenger cars by means of standard couplings meeting certain requirements for strength and safety, if recommendations of a subdivision of the Society of Automotive Engineers' Standards Committee are accepted.

A standard for touring-trailer couplings, applying to that part of the mechanism attached to the passenger car itself as well as to the coupling apparatus on the trailer, has been prepared and is now being considered by the passenger-car division of the SAE Standards Committee. The recommendation limits the standard to trailers towed by passenger cars.

"Trailer hitch" is the name given by the proposed standard to the part of the connecting mechanism attached to the passenger car itself. "Coupling" is the name for the part of the mechanism by which the connection is actually made and includes the entire mechanism back to the trailer frame.

Two sizes of coupling connections are provided in the proposed standard—No. 1 for trailers having a gross weight of up to and including 5000 lb; No. 2 for trailers over 5000 lb.

Coupling No. 1 is to have longitudinal tension and compression strength of 15,000 lb and vertical tension and compression strength of 7000 lb. Coupling No. 2 is to have twice these strength values.

No coupling is to be connected to the rear bumper of the towing car except where the bumper is specifically designed to carry the coupling unit, the standard provides. The coupling unit is to be located ahead of the face of the bumper to allow a minimum clearance of three inches between the bumper car and the coupling unit.

Other provisions specify the thickness of the steel at the hole, the size of the hole, and height of the platform above the ground.

"It was generally agreed at the meeting that the general coupling arrangement will be considerably improved in the next few years," says the *SAE Journal*, August, "and that because of these expected developments the recommendations may be more or less transitory. Accordingly the subdivision called attention to the importance of not including specific recommendations in regulatory legislation, and leaving the way open for revisions as rapidly as adopted.

"Trailers manufacturers attending the meeting indicated their desire that the SAE continue its cooperation in developing further engineering standards for this type of trailer. Several suggestions, including among others a study of brakes and braking connections, lighting equipment, and weight ratios between axles and the couplings were scheduled.

"Members of the committee and others interested in this work are submitting additional suggestions for trailer and trailer equipment standardization."

Government Sets Standard For Informative Advertising

The United States Government called for bids last month on surplus property which it desired to sell to anyone interested. Form No. 215, surplus property bid sale No. 269, described the articles for sale as follows:

Pewee, a mule, approximately 20 years old, tender footed and stiff in the joints.

Dick, a mule, about 18, weak tendon that causes left hind leg to drag.

Charlie, also a mule, about 18, windbroken.

Bootlegger, a horse, 20, "too fast for ordinary farm work."

Joe, a bay horse, 21, tender feet make him lame when used regularly.

No reports have been received as to the results of this advertising.

British Publish Machine Tool Standard

A NEW British Standard giving dimensions for machine tool elements, including milling machine spindle noses, arbors, and adapters; spindle noses for drilling machines; spindle flanges for combination turret lathes and capstan lathes; and T slots for milling machine tables, has just been issued by the British Standards Institution.

Two sizes of steep-taper spindle noses have been included in the new standard, one being smaller and the other one larger than the two sizes standardized in 1931. The four sizes now adopted have external diameters at the large end of 2-5/16 in., 3½ in., 5-1/16 in., and 7¾ in., respectively. The same general design has been followed for all sizes, including a taper of 3½ in. per foot on diameter. In the case of the small spindle nose, however, the keys are formed integral with the spindle for a compact design.

The original recommendation for the adapters to accomodate the old-type arbors was based upon American practice, and this form of adapter is now in wide use. The standard recommends that the adapters for the new sizes be made to fit on the taper. In the smallest size, a collar with recesses for the screw heads is used to keep the adapter in place, while in the largest size a draw bolt only is used. This lightens the parts to be handled and also makes it easier to assemble the adapter and the old-type arbors.

Standardization of the spindle flanges for combination turret and capstan lathes is a new British development.

The new British Standard, Dimensions for Machine Tool Elements, No. 739-1937, can be ordered from the ASA office.

British Propose to Certify Standard Electrical Products

A plan to safeguard the consumer against inferior products and workmanship by compulsory licensing and registration of electrical contractors and wiremen and by certifying that products meet the requirements of British Standards has been proposed by the Association of Supervising Electrical Engineers, London.

According to this proposal, a committee, representing the Electricity Commissioners, the Central Electricity Board, the Home Office, the Institution of Electrical Engineers, the insurance companies, the British Standards Institution, and employers and employees of the supply manufacturing and contracting sections of the industry would be organized. This committee would be empowered to register and issue licenses to manufacturers of electrical equipment, operatives, contractors, and others engaged in installation work; to provide for inspectors and strict enforcement of all regulations pertaining to installation of electrical equipment; and to make arrangements with the B.S.I. whereby materials, cables, fittings, and apparatus would be covered by British Standard Specifications and marked accordingly.

Adoption of these proposals, the Association believes, would insure good, safe workmanship, curb the practice of low price installation at the sacrifice of quality, stop the sale of electrical materials which do not comply with safety standards, and reduce insurance premiums for electrical installations against accidents and fire risks.

Argentine Standards Association Issues Monthly Publication

The national standardizing body of the Argentine, El Instituto Argentino de Racionalizacion de Materiales, is now issuing a monthly publication, copies of which are available from the American Standards Association. The booklet is published in Spanish.

News of the activities of the organization, and the text of various specifications and standard methods of test prepared by the organization, are given in each issue.

One section in the March issue is entitled "Cooperacion de la American Standards Association."

Through a cooperative arrangement, C. C. Batchelder, chairman, engineering committee, Chamber of Commerce of the U. S. A. in Argentina, is acting as liaison officer between the American Standards Association and the Instituto Argentino de Racionalizacion de Materiales. Mr. Batchelder is a member of the Advisory Committee of the Institute.

New Elevator Safety Code

NEW provisions for safety devices, terminal stopping devices, buffers, and interlocks have been incorporated in the 1937 edition of the Safety Code for Elevators, Dumbwaiters and Escalators, just approved by the American Standards Association. The changes have been made as the result of several years of extensive research carried on at the National Bureau of Standards and financed by the elevator industry.

The code, which is intended as a guide to state and municipal authorities in drafting their regulations, applies to the construction, inspection, maintenance, and operation of elevators, dumbwaiters, escalators, and their hoistways, and its purpose is to provide reasonable safety.

Its provisions are supplemented by other American Standard safety codes: the Safety Code for Mechanical Power-Transmission Apparatus, the National Electrical Safety Code, the National Electrical Code, the Code for Walkway Surfaces, the A.S.M.E. Boiler Construction Code, and the Building Exits Code.

In addition to the Safety Code for Elevators, the American Standards Association has approved a separate publication prepared for the use of inspectors, maintenance men, and repair men, which gives only such material from the Code as is of interest to them. This American Recommended Practice for the Inspection of Elevators (A17.2-1937) may be ordered from the American Standards Association at 75 cents a copy.

The American Standard Safety Code for Elevators, Dumbwaiters, and Escalators (A17.1-1937) is $1.00 per copy. Members of the American Standards Association are entitled to their usual 20 per cent discount on approved American Standards.

Revised Federal Specification Reclassifies Fire-Clay Brick

A revision in the Federal Specification for fire-clay brick (now HH-B-671b) eliminates the old system of symbols and substitutes names for the different classes of service. These classes, formerly M-73, H-57, H-75, and SH-75, are now known as:

1. **Moderate heat**
2. **Slag-resistant**
3. **Intermediate heat**
4. **High heat**

Two new classes have been added:

5. **Back-up duty**
6. **Super-duty**

The back-up duty class is for structural purposes such as exterior walls of boiler furnaces, and the super-duty for use under extremely severe service conditions where volume stability and resistance to temperature and slagging are important.

The requirements for the back-up class are:

(*a*) **Pyrometric-cone equivalent, minimum 26 (1,595 C),**

(*b*) **Compressive strength, minimum 3,000 lbs per sq in.**

The requirements for the super-duty class are:

(*a*) **Pyrometric-cone equivalent, minimum 33 (1,745 C)**

(*b*) **Linear contraction, maximum 1 per cent after reheating at 1600 C for 5 hours.**

(*c*) **Thermal spalling resistance, 18 cycles minimum after reheating at 1,450 C and quenching in water from 850 C.**

The slag-resistant class (formerly H-57) requires that the absorption be determined on the brick as delivered rather than on the brick after reheating at 1,400 C, as formerly. An upper limit of 10 per cent is specified for absorption. No changes have been made in the requirements for the other classes.

Copies of this revised Federal Specification may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at five cents each.

National Safety Council To Hold Annual Meeting

How to reduce the accident toll, which last year cost the lives of 111,000 people and a money loss of $3,700,000,000, will be the theme of the annual meeting of the National Safety Council October 11-15 at Kansas City.

Various phases of traffic, industrial, and home safety as well as safety education, for children, industrial workers, and the community in general, will be discussed. An exhibit of industrial and public safety equipment will be one of the features of the conference.

The National Safety Council is a Member-Body of the American Standards Association.

Surface Quality in Industry

A Review

by John Gaillard

Mechanical Engineer
American Standards Association

Comprehensive and authoritative study of surface quality –a problem of primary importance to industry – is given in new book by German engineer and industrialist.

ONE of the most important recent contributions to technical literature is a book on surface quality in industry *(Technische Oberflaechenkunde)*[1] by Dr. Gustav Schmaltz.[2]

The subtitle of the book reads in translation "Microgeometry and Properties of Boundary Surfaces of Technical Objects, Particularly Machine Parts", a subject of great industrial significance which has led to considerable research work in the major industrial countries during the last ten years.

In this country, active discussion of the problem was started by the presentation of R. E. W. Harrison's paper at the Annual Meeting of the American Society of Mechanical Engineers, December 1930, in which he described his "finish calibrator".[3] Shortly afterwards, a committee on Classification and Designation of Surface Qualities sponsored by the A.S.M.E. was organized under the auspices of the American Standards Association.

To distinguish clearly between the concepts "surface quality" and "shape" of a workpiece, Dr. Schmaltz proposes early in his book that we examine a square area of the surface, with a side of 1 mm (about 0.04 in.). Surface irregularities, *i.e.*, deviations from the mathematically true plane, lying within this small area, he calls "microgeometric"; these deviations concern *surface quality*. Irregularities extending beyond the small square he calls "macro-geometric"; these deviations concern the *shape* of the piece. In regard to the low limit of the micro-geometric range, he refers to Schmerwitz's investigations of polished steel and glass balls which showed that the size of irregularities on small melted and re-solidified glass surfaces was about one millimicron (0.4 millionth of an inch). Schmerwitz stated: "The most highly polished ball surfaces still appear to be quite *mountainous* within areas as small as about 1/100 sq mm (1/63,000 sq in.)".

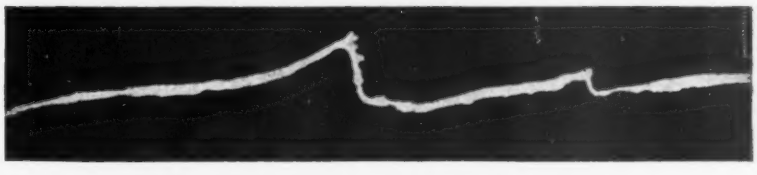
Dr. Schmaltz explains that when going into still finer detail, we can no longer speak of "surface" in the technical sense, since we then approach closely the atomic structure of the material. Here, dimensions are measured in the Angstrom unit (0.1 millimicron), hence the author considers one millimicron as the natural low limit for surface irregularities in the micro-geometric range.

He shows that surface quality does not depend solely on the micro-geometric shape of the boundary plane. The physical and chemical proper-

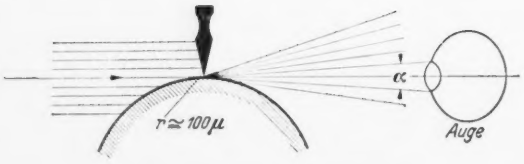
[1]Cloth binding, 6½ x 9¾ in., 286 pp, 396 illustrations, one table, Julius Springer, Berlin, 1936, 45.60 Marks.

[2]Dr. Schmaltz is the owner of the Schmaltz Brothers machine works, Offenbach on the Main, and an honorary professor at the Institute of Technology, Hanover.

[3]"A survey of surface quality standards and tolerance costs based on 1929-1930 precision grinding practice." Trans. A.S.M.E., 1931, MSP-53-12-111.



Profile of rough-turned steel. Direction of cut: right to left. Magnification 75×



Lichtspaltverfahren mit Messerlineal.

Use of straight-edge in judging a surface

ties of the boundary layers also play an important role. Hence, "surface" in the technical sense is defined as the thin boundary layer forming the transition between the material undisturbed by the finishing process of the workpiece and the atmosphere or the adjacent piece.

This transition layer itself consists of two portions. One is the *inner boundary layer* of solid metal, whose atomic structure has been changed by the finishing process. The influence of this finishing process, and the surface energy stored in the inner boundary layer are discussed.

The *outer boundary layer* is composed of adsorbed atmospheric gas and water. It appears that the thickness of this layer is only a few molecules and often even a single one—something like 0.1 to 1 millimicron, in the latter case. It influences the friction between two pieces.

This is true also for the thin layer of hydrocarbons (vaseline, lubricant, etc.) which in practice is always present on a finished part. By very careful cleaning with solvents, this layer may be reduced to a thickness of one molecule, or about one millimicron, but it cannot be completely removed. Pure metallic surfaces can be obtained only by heating the piece in high vacuum, or by removing the boundary layers mechanically (scraping). However, the composite outer boundary layer forms again very rapidly when the surface is exposed to the atmosphere. With metals subject to oxidation we have to count also with the thin layer of oxide (sometimes only 10 to 20 molecules thick) which may act as a protection of the pure metal or whose gaps may promote its corrosion.

How Surfaces Are Investigated

Methods and devices for investigating the nature of a surface are given comprehensive treatment by Dr. Schmaltz. The principal means of determining relative roughness of a surface—of primary interest to the mechanical engineer—are reviewed in the book. Listed briefly they are:

Sense of touch. Under favorable conditions, the sense of touch (fingertip or nail) easily permits detection of differences in surface level of 0.5 micron (0.00002 in.). The threshold lies at about one-fifth of this value, as has been shown in this country by Knudsen's experiments concerning "Hearing with the Sense of Touch".[4]

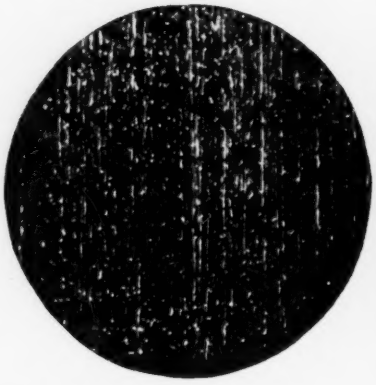
Visual Inspection. Unaided, the expert eye detects considerable surface detail, particularly with varying kinds of illumination (angle of reflection). Use of a straight-edge placed on a surface is considered to be suitable for judging irregularities as small as 0.8 to 1 micron.

The microscope as a means of surface inspection and the advantages of different kinds of illumination (vertical, oblique, annular, dark-field) are discussed, together with devices now available. With dark-field illumination, the light rays reflected by surface elements corresponding to the ideal plane or approaching it closely, do not enter the microscope. Only those rays that have hit irregularities (scratches) and hence deviate from the regular angle of reflection are visible through the ocular. This method will bring out scratches as shallow as 0.05 micron (2 millionths of an inch) which may occur, for example, in lapped or polished surfaces. Polished surfaces of the highest grade do not even show such fine scratches.

In this connection, Dr. Schmaltz also discusses: stereo-microscopic pictures; application of measurement to microscopic images; and comparison of a surface with samples of known character.

Surface Profiles. Greatest detail of the irregularities of a surface is obtained by recording its profile. Two principal methods are described. One consists in running a fine point over the surface and magnifying its ups and downs. The profilograph developed by Abbott and Firestone[5] belongs in this class. A drawback is that a re-

Fine polishing scratches in end face of gage block. Dark-field illumination. Magnification 100×



[4]Journal of Gen. Psychol., 1928, Vol. 1, p. 320.
[5]Specifying Surface Quality, by E. J. Abbott and F. A. Firestone, *Mech. Eng.*, Sept., 1933, p. 569.

cording point whose radius is large in relation to the surface irregularities partially slides over the latter and does not trace a true profile. A very fine point easily dents the surface, even under an extremely light load, such as a gram or less. Dr. Schmaltz holds that, in general, a point radius of 30 microns is the smallest that should be used (a gramophone needle point has a radius of 20 to 30 microns). High-grade machine finishes (grinding or diamond-turned) cannot be accurately recorded this way.

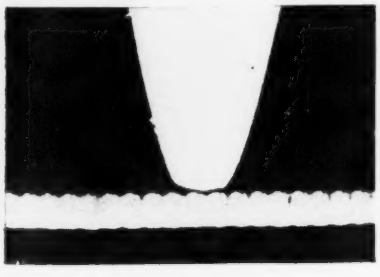
Integration Methods. By these, Dr. Schmaltz understands methods that give an integral value for the surface under investigation by measuring some property influenced by each of its elements, without, however, showing the influence of each individual element. Among the mechanical integration methods discussed are those based on tracing a profile with a point of calibrated radius, the sum of the partial "dips" of this point into the surface valleys giving a picture of the surface character (Flemming). Mainka measures the loss of energy of a pendulum whose motion is retarded by the surface, and Beck, the volume and the loss in pressure of air passing between the surface and a polished disk placed on it. Tornebohm's method is based on indentation of the surface by the spherical end of a plunger.[6]

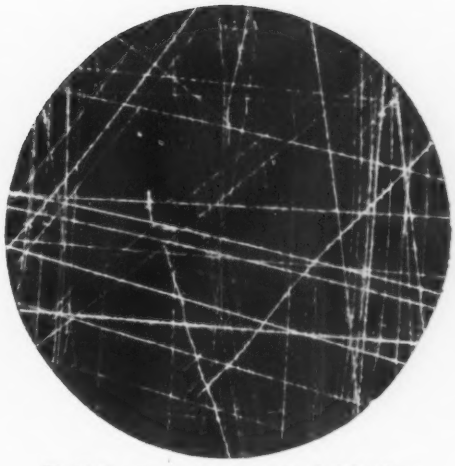
Physico-chemical integration methods comprise: determination of the actual area of a surface by means of an oxide layer deposited on it (Constable, Wilkins); by charging it with hydrogen (Bowden and Rideal) or with radio-active substances (Erbacher); or again, by determining the vapor pressure of a surface at high temperatures (Langmuir).

Among optical integration methods, the most important is based on reflection of light: determination of the limiting angle of regular reflection; capacity of the surface to reflect light of different wave lengths; and determination of the dispersion for different angles of reflection.

Methods based on interference phenomena of X-rays, electronic, and molecular rays also are briefly discussed.

Tracing point (gramophone needle) on surface with finest diamond-turned finish. Magnification 170×





Polished steel. Dark-field illumination. Magnification 71×

The book then deals with the question: "How can surface quality as represented partially by the size, shape, and distribution of surface irregularities be expressed in one or more numerical values?" In this connection, Dr. Schmaltz discusses Abbot's bearing-area curves[5]; frequency curves of the ordinates of the profile or the number of intersections between the profile curve and a straight line at different levels; and the "fulness factor" k, the quotient of the average depth of profile h_m and its maximum depth H (vertical distance between lowest and highest point). A standard rating of surfaces based on four classes and 14 sub-classes proposed by the author as the result of a large number of his measurements, is based on consideration of both H and k. The ratings of the fourteen sub-classes step up according to Preferred Numbers. The lowest quality (rough turning) corresponds to a value H lying between 315 and 1000 microns (0.0126 and 0.0400 in.) and the highest (fine lapping or polishing), to a value H ranging from zero to 0.3 micron (12 millionths of an inch). When k is lower than 0.4 or higher than 0.6, the rating of the surface as would be determined by H alone is modified—it is raised two grades when k is higher than 0.6 and lowered two grades when k is lower than 0.4.

The book deals very comprehensively with the influence of metal shaping and finishing processes, with and without removal of metal, and with their influence on the atomic structure of the boundary layer of the workpiece. A series of

[6] "Modern tolerance requirements and their scientific determination," by H. Tornebohm, *Mech. Eng.*, July, 1936, p. 411.

32 sheets of micrographs give an admirable review of examples of finishes obtained by commonly used workshop methods.

In dealing with the relation between surface quality and other properties of material and workpieces, the book discusses: resistivity against tension, compression and flexure, especially under alternating bending stress; friction between two surfaces; wear caused by a pure sliding motion and by combined rolling and sliding; fits between cylindrical parts; flow of fluids; and heat phenomena, such as transmission of heat, condensation, and evaporation.

In three major respects, Dr. Schmaltz's beautifully illustrated book is an outstanding contribution to the study of this problem. It clearly analyzes the essential features of surface quality—an extremely complicated concept. It gives a comprehensive review of the methods and devices so far developed for investigating the problem and the results obtained with them, giving numerous references to literature. Finally, it records the valuable results of the author's own extensive research. The book fascinates by the material it presents, and stimulates to investigation of the problems still to be solved.

Conspicuous Display of Approval Seal Planned by Gas Appliance Makers

A special tag or label showing the Seal of Approval of the American Gas Association is to be attached conspicuously after October 1 to the front of gas appliances which have received the approval of the Association laboratories. This auxiliary tag is in addition to the permanent Laboratory Seal of Approval which is a part of all such approved appliances.

Conspicuous display of the Seal ties in with the national advertising campaign based on the American Gas Association's national appliance testing and certification program, which in turn is based on standards prepared by the sectional committee and approved by the American Standards Association. National advertisements appearing in magazines and trade journals carry the Laboratory Seal of Approval, some of them incorporating a statement recommending that the buyer look for the Approval Seal. This makes it essential that the Seal be visible on all approved appliances.

The Seal is the buyer's guide and assurance that the appliance complies in detail with American Standards. A large number of manufacturers have been using the auxiliary tag and label forms since they were made available at cost from the American Gas Association Testing Laboratories as the result of a ruling adopted by the sectional committee at its meeting in June, 1936.

Members of the American Gas Association have commented on the fact that a uniform and prominent location for the Approval Seal is needed. Differences in construction and manufacturing difficulties in placing name plates on finished enamelled parts, make it difficult, however, to designate a uniform location for display of the permanent Seal of Approval. The auxiliary tag has, therefore, been adopted by the sectional committee as the logical method of insuring that the Blue Star Seal of Approval of the Testing Laboratories will appear in a prominent position on all approved gas appliances.

In view of the part the gas industry has taken in developing standards for consumer goods, the Advisory Committee on Ultimate Consumer Goods of the American Standards Association selected gas appliances as one of the first groups of commodities to study, and appointed a subcommittee on gas appliances to make recommendations. The subcommittee endorsed the gas industry's program, and recommended that the Laboratory Seal of Approval be prominently displayed on approved equipment as a guide to buyers. This action of the subcommittee was approved by the ASA Advisory Committee on Ultimate Consumer Goods early in June—another factor prompting the adoption of the ruling on auxiliary labels.

Petroleum Congress Drafts Dictionary of Terms

A standard dictionary of terms for use in the petroleum industry, including German, French, and English translations, has been proposed by the Second Petroleum Congress and published in draft form. The terms proposed by the committee on petroleum, No. 28, of the International Standards Association have been included in the dictionary, and are indicated by underlining. The technical terms cover several types of subjects in the petroleum field, such as: units of measure; geology, prospecting, and drilling; refining and

manufacture; products, their properties and use; and transportation, distribution, and sale. Copies of the dictionary can be borrowed from the American Standards Association.

International Subcommittees To Consider Acoustical Standards

International agreement on acoustical standards is being sought by the International Standards Association, in cooperation with the International Electrotechnical Commission and other international organizations interested in acoustics. Five subcommittees have already been appointed to study various phases of the problem.

The work has been undertaken under the auspices of the International Standards Association as the result of the conference called at the suggestion of the International Electrotechnical Commission at Paris, June 30 to July 3. Fourteen countries took part in the discussions. M. Duval, president of the French National Committee of the IEC, acted as chairman.

The subcommittees which have already been organized are:

International vocabulary on acoustics, Subcommittee 1 (Secretariat: France)
Units and methods of measurement: Objective noise meters, Subcommittee 2 (Secretariat: Great Britain)
Electro-Acoustics, Musical Acoustics, Subcommittee 3 (Secretariat: Germany)
Architectural acoustics, Subcommittee 4 (Secretariat: Great Britain)
Noise Abatement and vibration, medical acoustics, Subcommittee 5 (Secretariat: Italy)

Dr. Clayton H. Sharp, president of the U. S. National Committee of the IEC, and Dr. Harvey Fletcher, vice-chairman of the Sectional Committee on Acoustical Measurements and Terminology (Z24) were the American delegates participating in the conference.

Hotel Safety Group to Make Recommendations for Standards

Research and investigations prior to making recommendations for standard safe practices in New York City Hotels are soon to get under way, according to a recent announcement by the Hotel Safety Committee of Greater New York Safety Council. From a statement by A. C. Whiting of the Hotel Astor, chairman of the committee in charge, it is expected that suggested standards will be of distinct value to all hotels.

All physical hazards in hostelries will receive consideration and topics studied will be assigned to separate subcommittees for more thorough probing before making reports. Final recommendations will be published first in *Safety*, the Council's magazine, and then in loose-leaf form for ready reference.

A tentative list of topics includes: Banquet halls and ball rooms; bath rooms; boilers and pressure vessels; carpenter shop; doors; electrical; elevators; fire prevention and control; first aid treatment; floors and stairs; garbage disposal; glassware; guest rooms; kitchen equipment; knives; laundry; machinery; paint department; plate warmers and pot warmers; railings; restaurant equipment; rugs and carpets; sanitation; ventilation; wearing apparel.

Index to German Standards

An Index to German standards approved by the German national standardizing body, Deutscher Normenausschuss, has just been made available. Copies, published in German, can be borrowed or ordered from the American Standards Association Library. The price is $2.00 per copy.

One hundred thousand children in several sections of the country are being measured by the Bureau of Home Economics, U. S. Department of Agriculture. The information obtained from this study will be the basis for the work of a sectional committee which has been authorized by the Standards Council of the American Standards Association to develop standard sizes for children's garments.

This picture shows a Bureau worker taking measurements for the project.

U. S. Bureau of Home Economics